

**STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)**

**FROM MARCH 13<sup>th</sup> TO 25<sup>th</sup> AUGUST**

**AT CONVERGE GLOBAL CONCEPT TECHNOLOGIES**

**THE QUAD, 20 LAYI YUSUF CRESENT, LEKKI, LAGOS, NIGERIA**



**A TECHNICAL REPORT, BY**

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**SUBMITTED TO THE DEPARTMENT OF COMPUTER AND  
INFORMATION SCIENCES, COLLEGE OF SCIENCE AND  
TECHNOLOGY, COVENANT UNIVERSITY**

***IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE OF  
BACHELOR OF SCIENCE (BSc), COMPUTER SCIENCE***

**COVENANT UNIVERSITY, OTA, OGUN, NIGERIA**



**OCTOBER 2023**

## **Dedication**

I dedicate this to my parents – for their blood, sweat, tears, and sacrifice in getting me to where I am today. Without them, I would be nowhere near capable of putting myself through university.

Their love, support, and guidance make life worth living to the fullest and constantly encourages me to do my best in all the endeavours I pursue.

## **Acknowledgements**

I wish to acknowledge the Almighty God first, because without him, none of this would have been possible in any way.

I also would like to acknowledge my supervisor at work, Mr. Ugochukwu Okorie. He was exceedingly patient with me throughout the duration of my stay and tried his best to guide me into being the best intern I could be.

Covenant University, my institution of learning, also deserves praise because their commitment to full-scale blended learning gave me an edge over other applicants as I was able to demonstrate prior knowledge of applicable skills in the workplace that I had acquired from Coursera.

Lastly, to my friends who were there for me, offering encouragement and motivation throughout the period, I'm grateful for each and every one of you.

## **Abstract**

This report goes over the highlights of my industrial work experience placement at Converge Technologies, which laste for 24 weeks and started on March 13<sup>th</sup> and ended August 25<sup>th</sup> 2023.

It provides an overview of the entire process from start to finish, the background information behind the programme, the work I performed at the company, its relevance to my course of study, as well as the challenges and issues I faced.

The report also covers the company's goals, work ethics, business practices, activities, and culture and their influence on the time I spent there.

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## **1. Introduction**

### **1.1. Student Industrial Working Scheme (SIWES)**

The SIWES<sup>1</sup> is a skills training programme administered by the ITF<sup>2</sup> designed to prepare and expose students of higher education for the industrial work situation they are likely to meet after graduation. The Scheme affords students the opportunity of familiarising and exposing themselves to handling equipment and machinery that are usually not available in their institutions. (“More on SIWES” 2023)

It aims to:

- Make the transition from school to the world of work easier, and enhance students' contacts for later job placement.
- Provide students with an opportunity to apply their knowledge in real work situation thereby bridging the gap between theory and practice.
- Enlist and strengthen employers' involvement in the entire educational process and prepare students for employment after graduation.

#### **1.1.1. Collection of Relevant SIWES Documents**

During the first semester of my third year, I met Mr. B. O. Odusote to collect the things I needed. It consisted of the following:

- A letter of introduction that authorised us for the SIWES training.
- A logbook - in which I was to note down my day-to-day activities along with relevant diagrams and sketches.

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<sup>1</sup>Student Industrial Working Experience Scheme

<sup>2</sup>Industrial Training Fund

- A SCAF<sup>3</sup> - to be submitted at the commencement of the thing.
- An ITF Form 8 with list of offices.
- An ITF Form C - an assessment of the industrial training.

I then proceeded to make scans of the forms for safekeeping.

After that we had an orientation with some officials from the university, along with the Dean of Student Affairs, to instruct us on our conduct during the internship period and answer all the questions that we had.

### **1.1.2. Internship Application and Acceptance**

I sent an email to the company with my résumé and SIWES letter and was invited for a physical chat on the 1<sup>st</sup> of March, 2023. During the interview, I was asked about my previous experience working with Linux systems and other relevant questions.

After the interview, I was reached out to resume on the 13<sup>th</sup> of March, 2023. I was also instructed to print out a copy of their internal internship form and fill it, for record-keeping.

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<sup>3</sup>Student Commencement of Attachment Form

*SIWES Report, Fumnanya Mowete*

 hr@convergroup.com  
RE: Internship Placement  
To: Fumnanya Mowete

7 March 2023 at 16:41

---

Dear Fumnanya,

Trust you are good.

Kindly be informed that your application for internship placement in our establishment has been reviewed and approved.

Your resumption date is **Monday, 13<sup>th</sup> March, 2023**.

Kindly find attached our internship form, please fill it and share on or before your resumption.

Best Regards,  
Chidinma I. Orakwe  
Human Resources Manager  
Converge I G. C. T.  
The Quad Building, No. 20 Layi Yusuf Crescent,  
Lekki Phase 1, Lagos State.  
Tel.: +234 1 3425910  
Mobile: +234 7065308830  
Email: [chidinma.orakwe@convergroup.com](mailto:chidinma.orakwe@convergroup.com)  
Website: [www.convergroup.com](http://www.convergroup.com)  
Support: [support@convergroup.com](mailto:support@convergroup.com)  
+234 8022558555

Figure 1: Email correspondence informing me of my acceptance

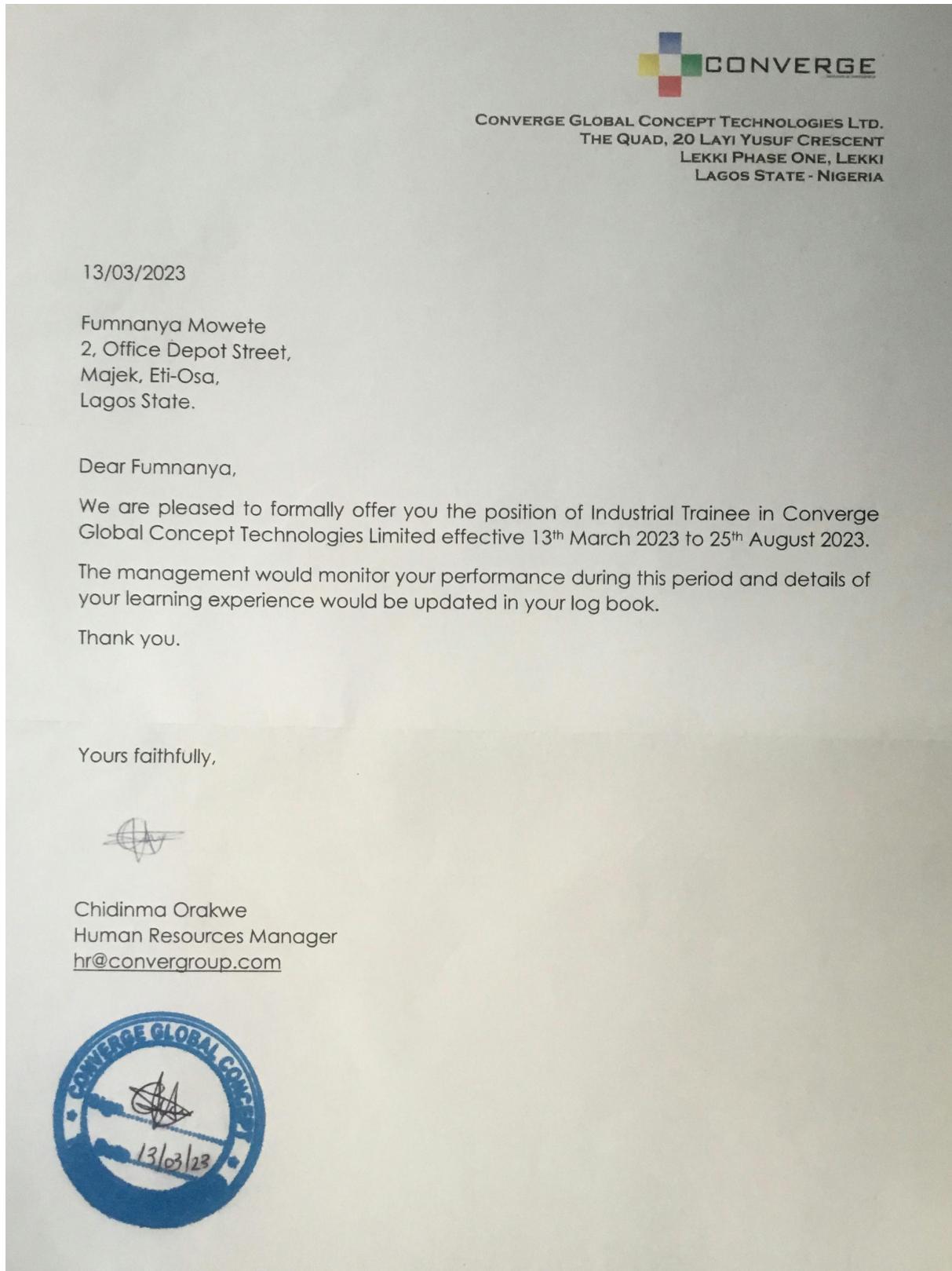


Figure 2: My acceptance letter

## **1.2. About the Company: Converge Technologies**

### **1.2.1. Historical background**

Converge Technologies is a technology services organization that specializes in the deployment of mission-critical technology systems, solutions and services.

They are a customer-focused organization providing a range of solutions to meet the changing business demands and challenges of our clients. They are truly passionate about their customers' satisfaction and delight.

Their mission is to deliver cutting edge technologies that trigger business growth and redefine the standards of service delivery at different levels in any organization, while their vision is to become the continent leader and the very best in the solutions they deliver ("About Our Company" 2023).

They are located in The Quad, 20 Layi Yusuf Crescent, Eti-Osa 106104, Lekki, Lagos

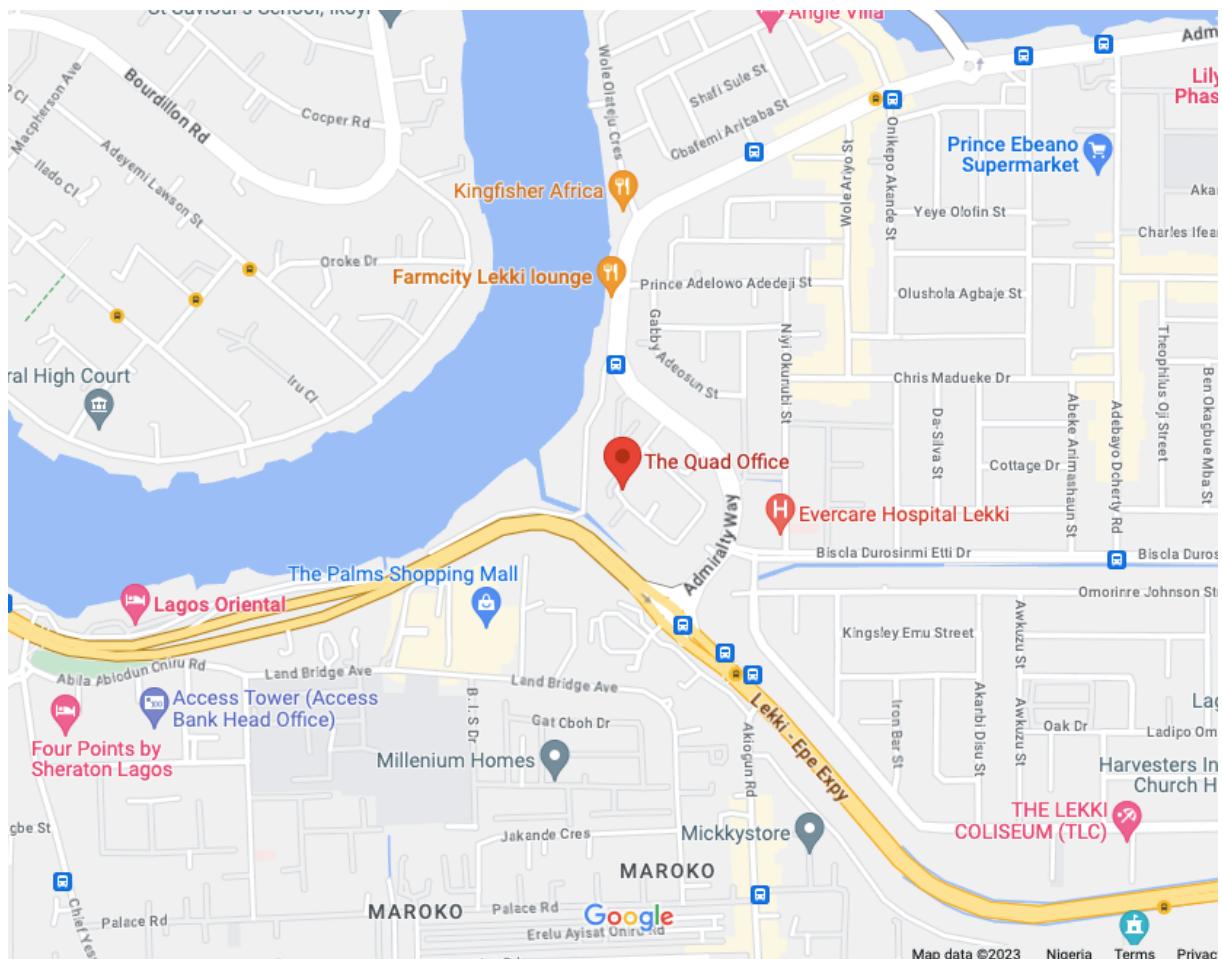


Figure 3: Location of the Converge main office

### 1.2.2. Services offered

Converge, in collaboration with our partner Red Hat, plays a pivotal role in delivering mission-critical infrastructure solutions for their clients. By harnessing Red Hat's suite of products, such as RHEL<sup>4</sup>, they cater to diverse business needs in key areas like:

- 1. Data Centre Solutions:** Leveraging RHEL, they provide clients with robust data centre solutions that ensure data integrity, scalability, and high availability. This is essential for businesses handling large volumes of

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<sup>4</sup>Red Hat Enterprise Linux

sensitive data and demanding uninterrupted operations, such as financial institutions.,

2. **Cloud Deployments:** Red Hat OpenShift enables the company to build agile and secure cloud environments for their clients. This empowers businesses to harness the full potential of cloud technology while maintaining data security and compliance.
3. **Security:** Red Hat's integrates security into its products and solutions, such as SELinux<sup>5</sup>, which enhances their clients' ability to fortify their infrastructure against cyber threats. These products offer reliable security mechanisms crucial for safeguarding critical business data.
4. **Automation:** Red Hat Ansible Automation Platform is instrumental in streamlining processes for their clients. By automating routine tasks and workflows, they increase efficiency, reduce human error, and allow clients to focus on core business operations.
5. **Virtualisation and Containers:** Combining Red Hat Virtualization and Red Hat OpenShift, they offer clients the best of both worlds. Virtualisation for legacy systems and containerisation for modern, scalable applications. This flexibility is vital in catering to diverse business requirements.

### **1.3. Submission of documents**

#### **1.3.1. To CU SIWES Office**

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<sup>5</sup>Security-Enhanced Linux

- Acceptance letter: I sent an email to the SIWES office confirming the receipt of my acceptance letter, sent by the company's HR department.

The image contains two screenshots of email messages. The top screenshot shows an email from 'Fumanya Kavan Mowete' to 'd siwes@covenantuniversity.edu.ng'. The subject is 'Enquiry about receipt of offer letter'. The message body reads:

Dear Sir/Madam,  
I would like to confirm the receipt of my offer letter from my company for my SIWES. My details are:  
• Fumanya Kavan Mowete - 20CG028103  
• Company: Converge Global Concept Technologies Ltd.  
I appreciate your swift response.  
Best regards,  
Fumanya Mowete

The bottom screenshot shows a reply from 'SIWES CU' to the same email. The subject is 'Re: Enquiry about receipt of offer letter'. The message body reads:

Dear Fumanya, We are pleased to inform you that your letter of acceptance from Converge Global was received today March 22, 2023 , and the same was immediately Acknowledged. Thank you.

Figure 4: Email correspondence acknowledging receipt of my offer letter

### 1.3.2. To ITF

- SCAF: This was filled and submitted on March 24<sup>th</sup>, in order to meet the two-week deadline imposed by ITF for the submission of the form.



ITF Area Office.....

Institution.....

Name of Organization:.....

Phone Number of Organization:.....

.....

E-mail of Organization:.....

Location Address:.....

S/No.	Name of Student	Matric No:	Course of Study and Year/Level	Period of Attachment in Months	Date of Commencement	Date of Completion	Remarks

NOTE: This Form is to be Completed and sent to the nearest ITF Area Office within 10 days of Resumption.

Date:.....

Stamp and Signature of Employer:.....

Figure 5: Student Commencement of Attachment form

#### 1.4. Commencement of internship

Upon my resumption on March 13<sup>th</sup>, I was given a HSE<sup>6</sup> walkthrough of the company in order to minimize hazards and prevent accidents at the workplace. This involved instructing me on the emergency evacuation procedures, what the various alarm systems signified, and showing me the emergency exits and muster points.

I was then given my personalised keycard for getting through the office doors, as well as my official email address for all company communication.

After that, I was introduced to my manager, Mr. Ugochukwu Okorie, head of the Data Centre, Security & Automation team – to whom I would be directly

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<sup>6</sup>Health, Safety and Environment

reporting. He gave me an overview of my expected responsibilities and tasks, which included:

- Learning about various Red Hat products and solutions offered by the company.
- Attending technical meetings and shadowing employees and contractors while they performed various tasks.
- Helping with various support tasks around the office.
- Setting up, documenting and testing proofs of concept for proffered solutions to client companies.

We also discussed how frequent I was expected to check in with him, and assignments I was expected to embark upon.

## **2. Facilities available**

### **2.1. Facilities & Tools**

Converge makes use of various tools, consisting of both hardware and software, to make day-to-day running of the company efficient. As an intern, I was entitled to some of these – some notable ones are:

1. **Laptop:** Laptop computers provide employees with mobility and flexibility, allowing them to work securely from various locations while still adhering to the company's security protocols. I was given a company-branded Hewlett-Packard Probook 650 G1 for official use.



Figure 6: A HP ProBook 650 G1 laptop

2. **Computer Monitor:** A computer monitor is essential for efficient work, which give allowance for a larger display for employees to manage and view data securely without compromising visibility. I was provided with a Dell 34" monitor.



Figure 7: A Dell S3423DWC monitor

**3. Official Email Address:** The company chose to host its email over a more general-purpose solution in order to ensure confidentiality, integrity, and availability of business-related communications, thereby safeguarding sensitive information.

The screenshot shows a webmail interface with the following message list:

Subject	From	Date	Size
ManageEngine Endpoint Management Solutions Newsletter	ManageEngine	Wed 12:07	47 KB
Access the Leading with Open Sales Club slides	Red Hat EMEA Ecosystem	Mon 05:54	32 KB
Still time to register for the Leading with Open Sales Club – October 20, 2023	Red Hat EMEA Ecosystem	2023-10-17 02:00	44 KB
[ManageEngine] Enterprise IT security and compliance solution	Bruce   ManageEngine	2023-10-16 10:13	22 KB
The Red Hat Leading with Automation newsletter	Red Hat Partner	2023-10-11 02:00	79 KB
Red Hat EMEA Partner Enablement Bulletin October 2023	EMEA Partner Programs & Devel...	2023-10-10 09:01	106 KB
UEMS Free Training: Learn to manage and secure your endpoints with product experts	ManageEngine	2023-10-10 05:02	46 KB
Join the Leading with Open Sales Club – October 20, 2023	Red Hat EMEA Ecosystem	2023-10-06 02:00	44 KB
Red Hat Partner Training Portal Monthly Curriculum Report	no-reply@training.redhat.com	2023-10-03 21:02	7 KB
RE: HYBRID MODE OF OPERATION	chidinma.orakwe@convergroup....	2023-09-29 04:16	336 KB
ManageEngine Endpoint Management Solutions Newsletter	ManageEngine	2023-09-28 13:07	56 KB
If you're looking for SIEM, Log360 is your best bet. Here's why	Bruce   ManageEngine	2023-09-28 10:51	20 KB
ManageEngine: EMS free-training certificate	ems-exams@manageengine.com	2023-09-27 02:11	6 KB
RE: HYBRID MODE OF OPERATION	temitope.bankole@convergroup....	2023-09-25 04:16	222 KB
RE: HYBRID MODE OF OPERATION	eze.akalugwu@convergroup.com	2023-09-25 04:12	302 KB
RE: HYBRID MODE OF OPERATION	chidinma.orakwe@convergroup....	2023-09-25 03:34	325 KB
UEMS Free Training: Access our training session recording here	ManageEngine	2023-09-15 09:25	27 KB
Red Hat EMEA Partner Enablement Bulletin September 2023	EMEA Partner Programs & Devel...	2023-09-14 08:02	116 KB
The Red Hat Leading with Automation newsletter	Red Hat Partner	2023-09-13 02:30	91 KB

Figure 8: My inbox on the company-hosted email website

**4. Mozilla Thunderbird:** Thunderbird was chosen as it is the premier open-source email client that helps in securely managing and accessing company email, with robust features for encryption, calendar management, and spam filtering.

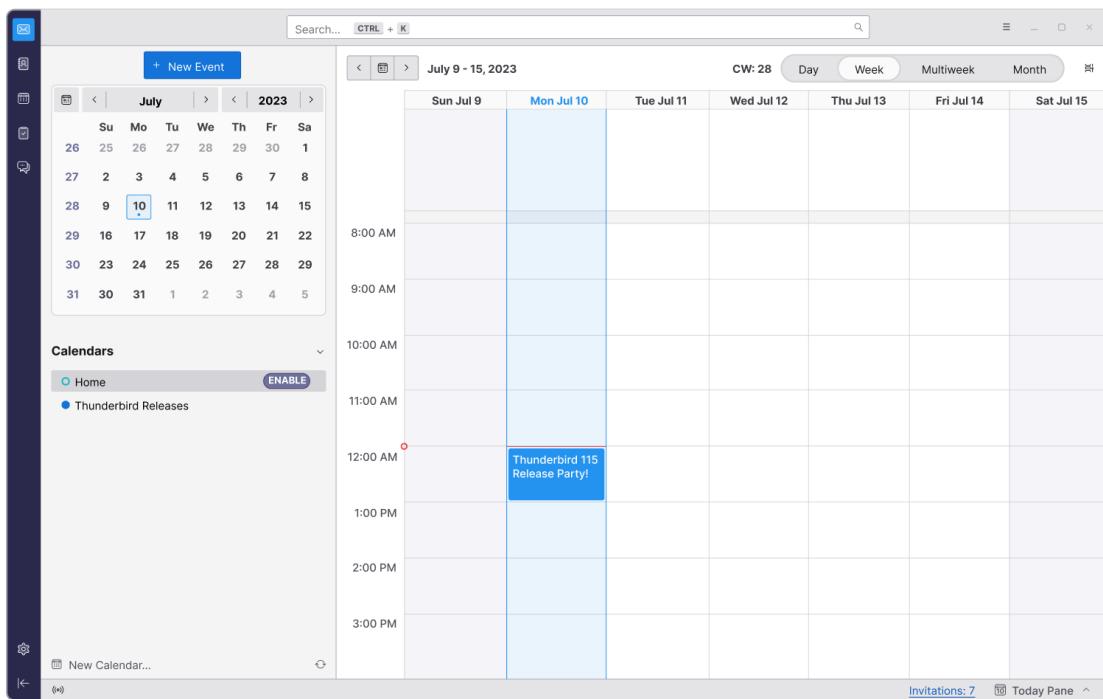


Figure 9: The calendar view in Thunderbird

**5. All-in-one Colour Printer:** There's multiple printers on premises for producing hard copies of documents – which can be necessary for secure documentation, especially when sensitive information needs to be physically stored or shared securely. One of these was a Hewlett-Packard LaserJet Pro MFP M28a.



Figure 10: A HP LaserJet Pro MFP M28a printer

**6. Wi-Fi Access Point:** We were provided with secure and controlled wireless network access, allowing us to work from various locations within the company premises while maintaining network security standards. The internet was provided by Spectranet.



Figure 11: Spectranet logo

**7. Red Hat Portal:** The Red Hat Portal is a secure platform for accessing and managing Red Hat Enterprise Linux subscriptions and support, which is vital for maintaining a secure and reliable operating environment. I primarily engaged with my coursework material on the Partner Training portal.

The screenshot shows the 'My Learning' section of the Red Hat Partner Training Portal. It displays four completed courses:

- Red Hat OpenShift Administration I: Managing Containers and Kubernetes (DO180) v4.12**  
Completed (Score: 80) Jul-07-23 00:52 CET Last Completed: Jul-24-23 09:50 CET  
Deploy, manage, and troubleshoot containerized applications running as Kubernetes workloads in OpenShift clusters.
- (RETIRING) Red Hat Insights for Technical Sales**  
Completed (Score: 93.33) Jun-05-23 14:48 CET Last Completed: Aug-02-23 09:41 CET  
Retiring October 31, 2023
- (RETIRING) Red Hat Foundations**  
Completed (Score: 75) Jun-05-23 13:57 CET Last Completed: Jul-24-23 10:21 CET  
Retiring October 31, 2023
- Red Hat Enterprise Linux Automation with Ansible (RH294)**  
Completed (Score: 87.5) May-17-23 13:39 CET Last Completed: May-22-23 07:05 CET

Figure 12: The Training Portal's 'My Completed Training' page

**8. Enterprise Linux:** Enterprise Linux is known for its security features and reliability, making it an excellent choice for a secure company environment, ensuring the protection of critical data and applications.

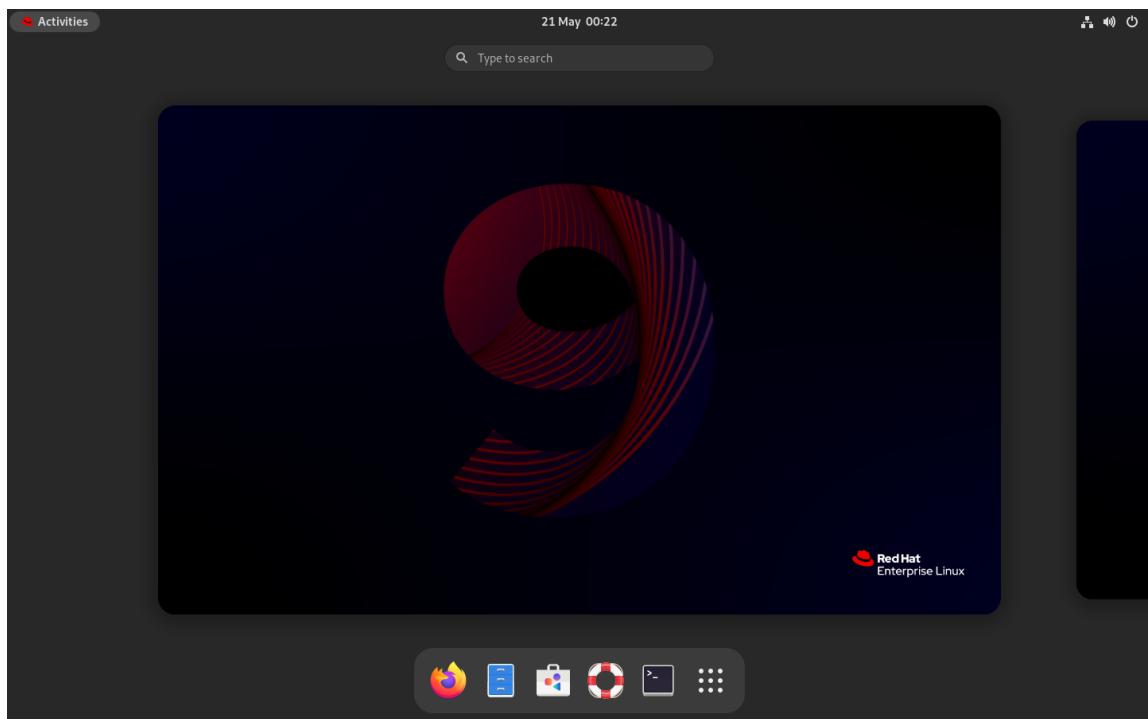


Figure 13: The Red Hat Enterprise Linux 9 desktop

9. **Podman:** Podman is a container engine – used for effectively managing and sandboxing applications, allowing them to be efficiently rolled out and scaled as needed. It also has the feature of primarily running without escalated security permissions, which gives it an edge over its alternatives.

```
podman run quay.io/podman/hello

!... Hello Podman World ...!

      .--"--
      / -      - \
      / (0)    (0) \
      ~~~| -=(,Y,)=- |
      .---. /` \   |~~
      ~/  o  o \~~~.----. ~~
      | =(X)= |~ / (0 (0) \
      ~~~~~~ ~| =(Y_)=- |
      ~~~~  ~~~|   U   |~~

Project:  https://github.com/containers/podman
Website:  https://podman.io
Documents: https://docs.podman.io
Twitter:  @Podman_io
```

Figure 14: The 'Hello World' image running on Podman

10. **Kubernetes:** Kubernetes is primarily used for container orchestration and automating software deployment, scaling, and management by grouping containers as pods – which can then be managed effectively.

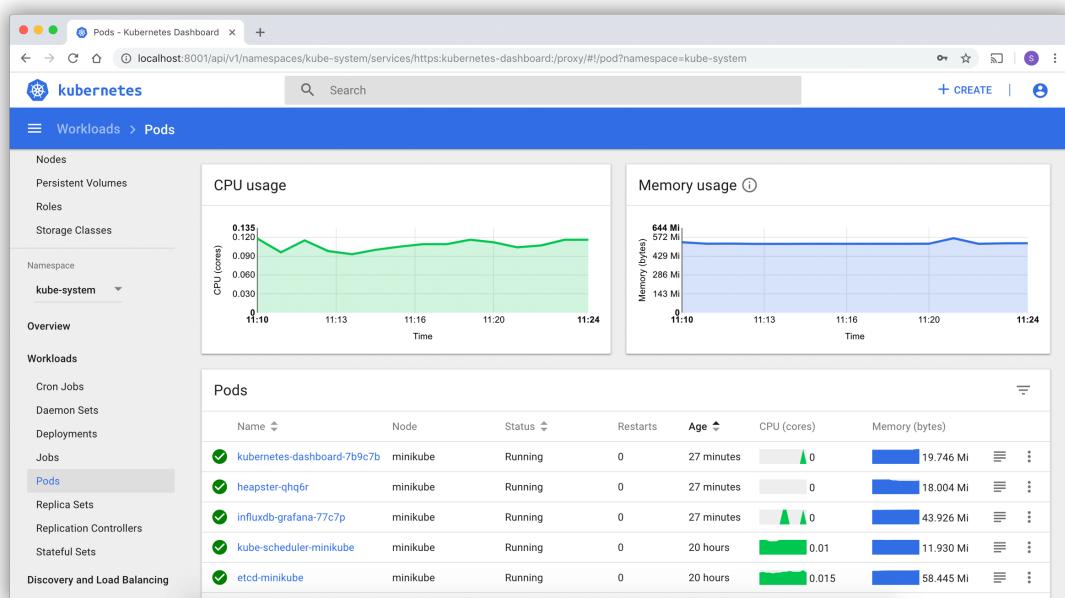


Figure 15: The Kubernetes web interface

**11. Windows Server 2019:** Windows Server 2019 provides a secure and stable platform for hosting critical company applications and services, with widespread support for commonly used technologies like Active Directory and built-in security features for data protection.

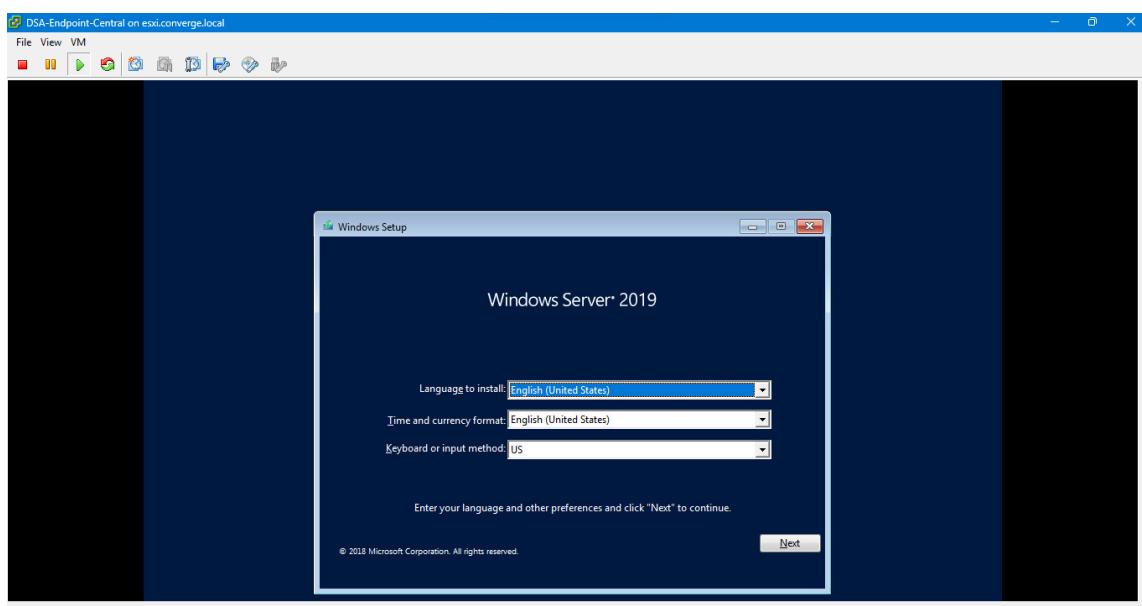


Figure 16: The Windows Server 2019 Installer

12. **VMWare ESXi:** It's an enterprise-class, type-1 virtual machine hypervisor developed by VMware for deploying and serving virtual computers. It runs on bare metal without running an operating system unlike other VMware products as it includes its own kernel.

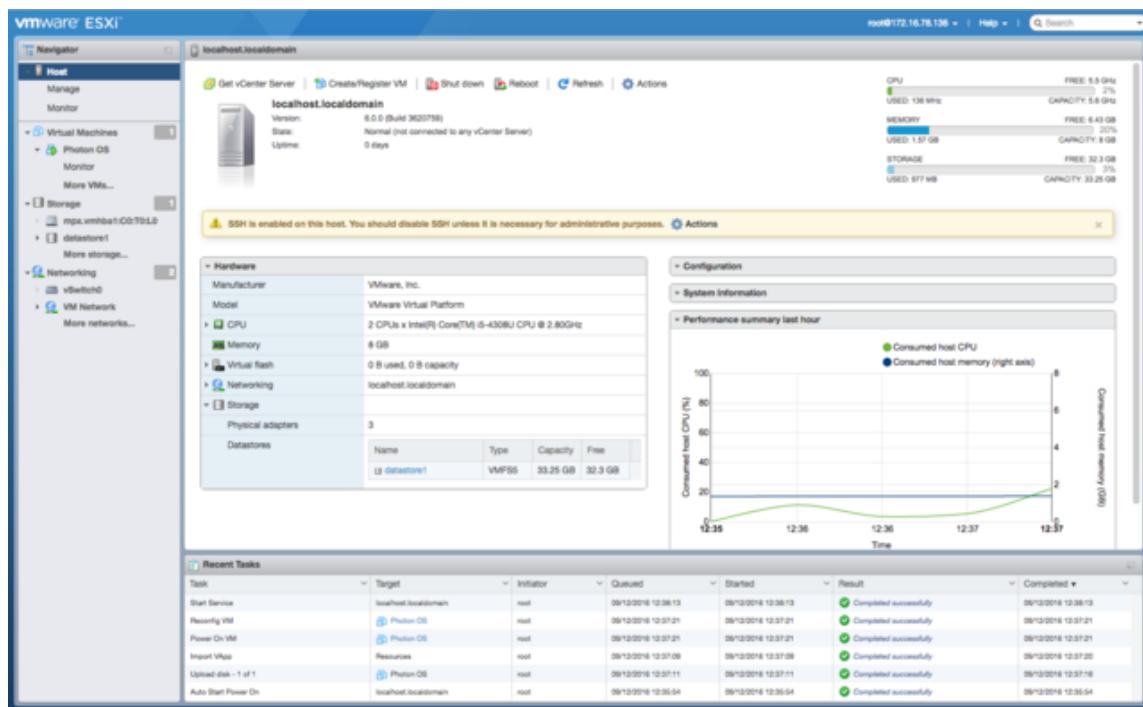


Figure 17: VMware ESXi Host Client summary page from 6.0 U2

(Codename Lisa 2017)

13. **ManageEngine Endpoint Central:** Endpoint Central can manage endpoint devices (e.g. laptops, printers, phones) that are situated within the enterprise, allowing them to be monitored, administered, patched and updated remotely.

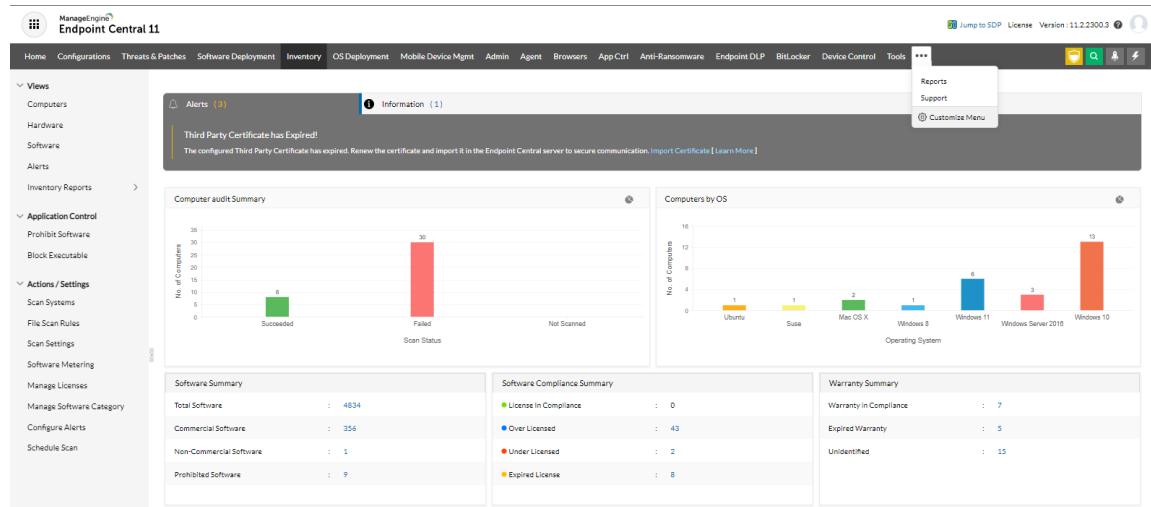


Figure 18: Endpoint Central Asset Management page

**14. Microsoft Teams:** Teams offers a secure platform for communication and collaboration, including features like end-to-end encryption and multi-factor authentication, ensuring confidential discussions and file sharing.

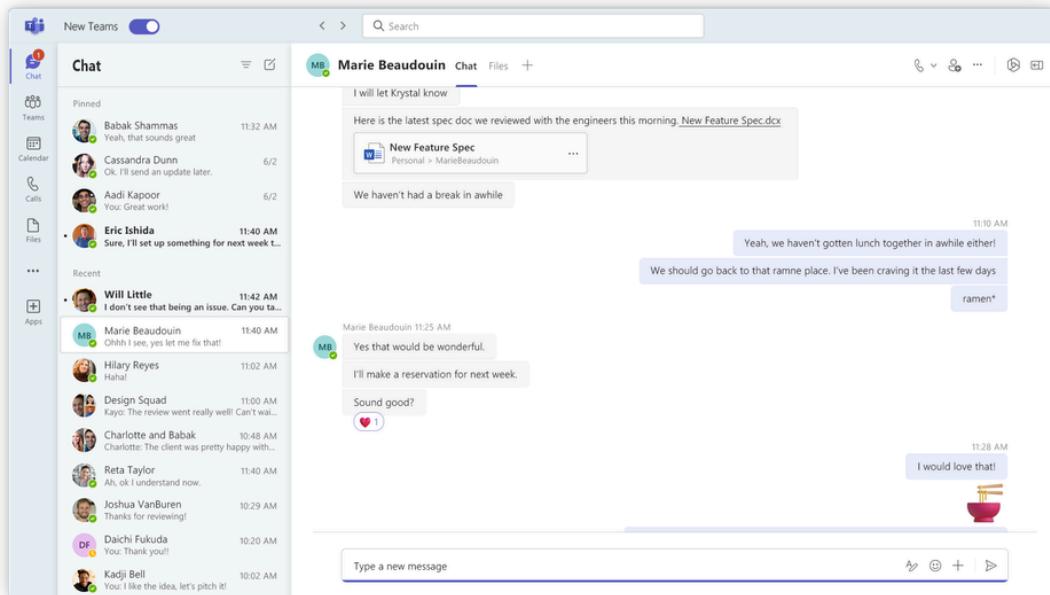


Figure 19: The Teams window in the Chat view

**15. GitLab:** Gitlab is a source code management and version control platform, essential for safeguarding proprietary source code and tracking changes

while ensuring the integrity of the codebase. In addition, its self-hosting capabilities make it attractive for enterprise as it can be modified to meet specific security and operational requirements.

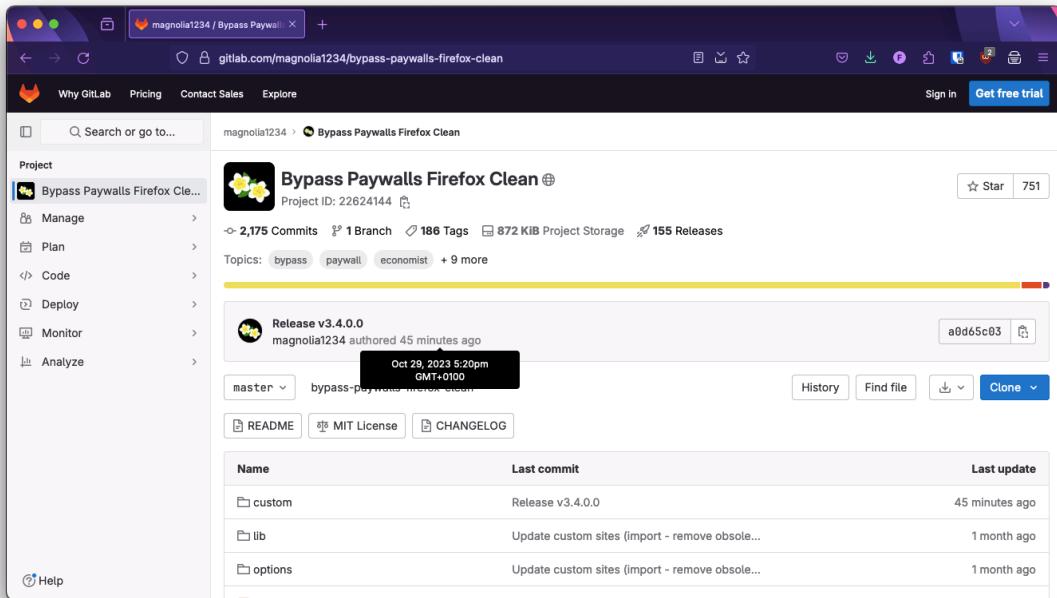


Figure 20: A code repository hosted on GitLab

## 2.2. Quality of supervision

As a member of the DSA<sup>7</sup> team, I was assigned the head manager, Mr. Ugochukwu Okorie as my primary supervisor. Additionally I was to occasionally check in with the General Manager, Onyekachi Nnamdi, so that any company-wide concerns I have could be relayed to her.

Mr. Ugochukwu had a talk with me about my prior familiarity with Linux and interest in system administration and security and decided that it would be best for us to have biweekly meetings discussing what I'd done in the previous fortnight. He also gave me various tasks and assignments to complete and

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<sup>7</sup>Data Centre, Security & Automation

ensured I was following along with all the activites of the rest of the team, which involved attending and participating in meetings, and being entrusted with some trivial tasks.

Along with these, he also taught me to think of the business and economic factors of any technical solution – the lesson being a product, no matter how impressive, means nothing if it's not commercially attractive to clients.

The supervision provided was excellent, as everything was done with the aim of making my stay comfortable while also allowing me to branch out, make necessary mistakes, and learn from those experiences.

### **2.3. Knowledge Gained**

I learnt numerous things from my experience at the company – with everything from hard technical skills that involve working with software to soft interpersonal skills that deal with relating healthily with others in the office.

Some of the more notable ones are:

#### **2.3.1. Technical Skills**

- *Usage of standard POSIX<sup>8</sup> tools:* Command-line utilities like `bash` (the GNU Bourne-Again Shell), `grep` (file pattern searcher) and `man` (manual pager) are irreplaceable when working with servers all over the globe. They provide a standard way of interfacing with the internal workings of a system – and these behaviours are laid out in the POSIX specification (IEEE Computer Society 2017).

Many modern OSes conform to this standard (“UNIX® Certified Products” 2023), so knowing how to use them correctly is an essential tool in the arsenal

of a system administrator. Therefore, I learnt basic and advanced concepts related to these like shell redirection, task scheduling, and storage configuration, along with user and group management.

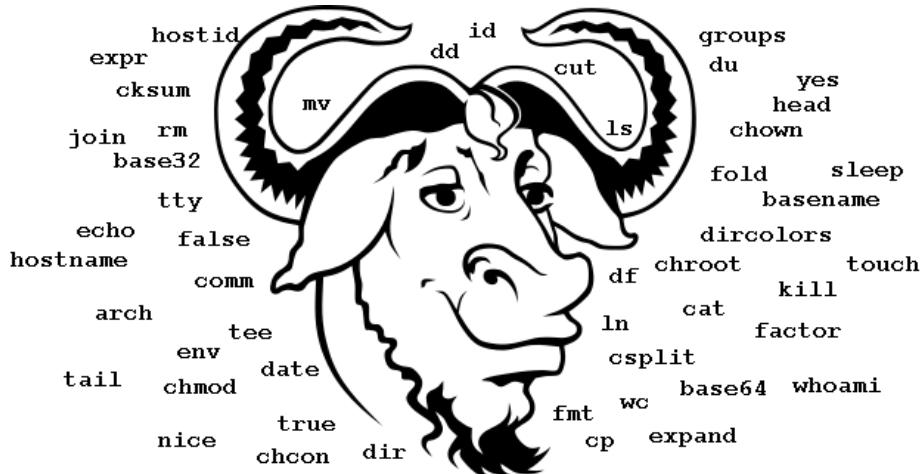


Figure 21: The GNU core utilities (MaiZure 2019)

- *Virtualisation with VMWare ESXi:* Virtualisation logically divides computer resources allowing hardware to be simulated – this lets multiple operating systems run on the same physical hardware. ESXi improves on traditional hosted virtualisation by being a type-1 hypervisor, where it runs without a traditional operating system (Robert P. Goldberg 1973).

In enterprise, this enables numerous operating systems to be run simultaneously, while isolating them from each other, enhancing manageability and security.

During my internship, I was tasked with creation, maintenance, and overall administration of several virtual machines.

- *Containerisation with Podman:* Containerisation packages applications, along with any required runtimes and dependencies, into units that can run

independently and reliably on any computer system. They have the advantage of being lighter and more efficient than full-blown virtual machines, as well as offering more control over the scale of applications. Podman is the premier tool of the OCI<sup>9</sup> and has support for running containers without escalated privileges – which dramatically increases its security compared to other container engines.

Learning the ins and outs of Podman was one of the key experiences I had during my internship.

- *Container orchestration with Kubernetes:* Industrial-scale applications can consist of hundreds of containers working in tandem - and organising them all by hand becomes infeasible. Kubernetes aims to solve this problem by coordinating, onfiguring, and managing containers automatically.

It does this by dividing computing resources in the cluster into two groups – the control plane which coordinates all the other nodes, and the nodes themselves on which the actual containers are deployed.

Red Hat has supported Kubernetes from inception as part of their OpenShift offering (Red Hat 2014), and as such I was required to delve into it.

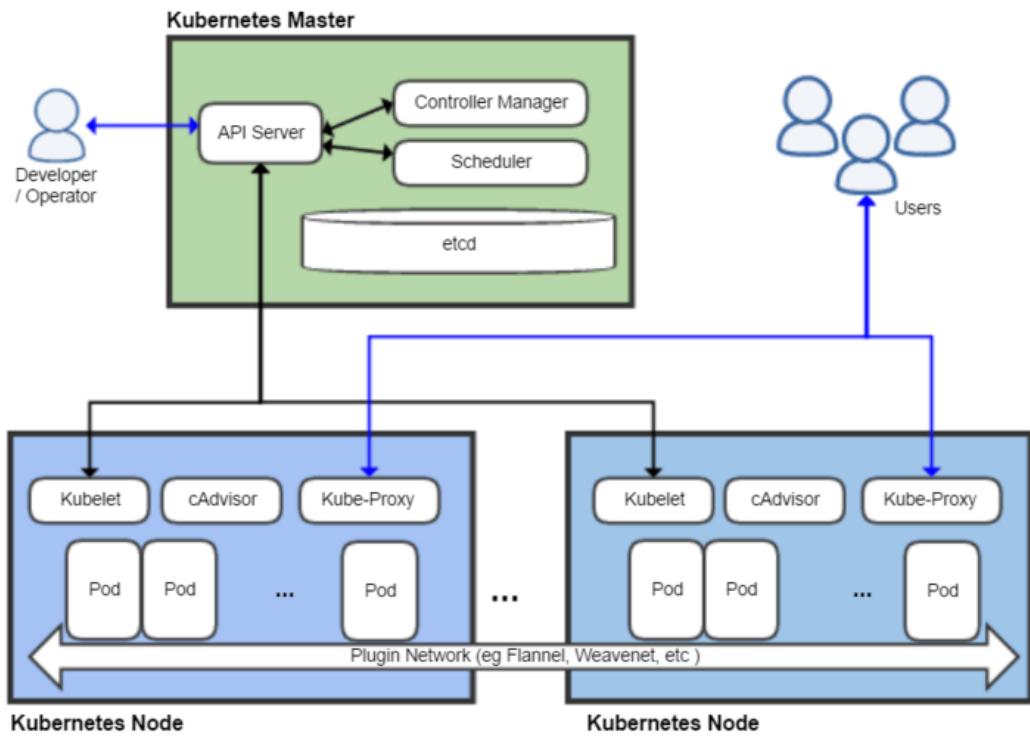


Figure 22: Kubernetes architecture diagram (Khtan66 2016)

- *Cloud development with the Red Hat OpenShift Container Platform:*

OpenShift is a cloud platform that makes it easy to deploy and manage containerised applications on the hybrid cloud – whether fully on the edge, or on premises. It builds on top of Kubernetes by adding tools like Prometheus for reliability monitoring and wrapping them all up in a simple, easy-to-use interface – allowing enterprises to adopt it with ease and focus on actually maintaining their application.

It also utilises Red Hat Enterprise Linux for a consistent platform anywhere it runs.

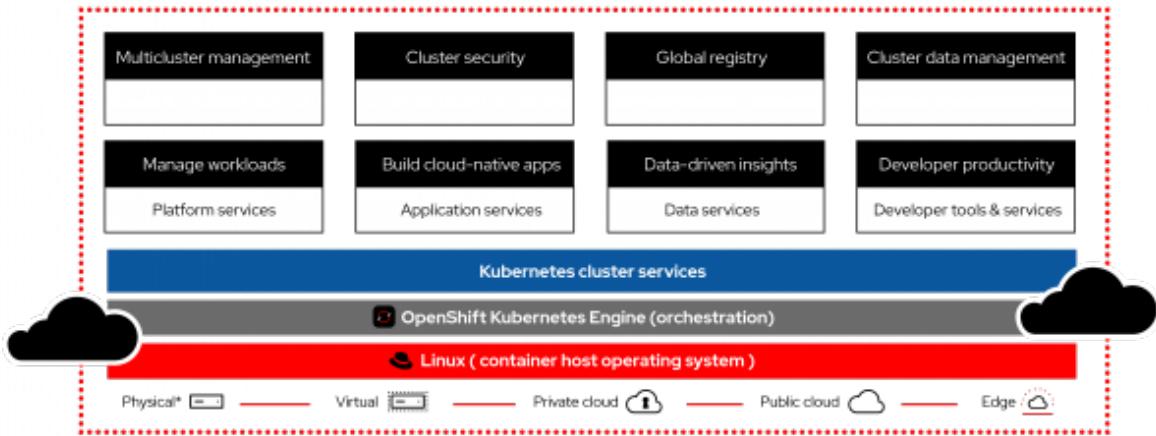


Figure 23: Architecture of the OpenShift Platform (Red Hat 2023)

- *Systems management with Red Hat Satellite*: Satellite is used to deploy and manage RHEL<sup>10</sup> hosts. It manages updates and automatically downloads them locally in order to make it easier to deploy to the fleet. It also supports separating hosts into different “environments”, in order to facilitate software deployment and testing.
- *Automation with Red Hat Ansible Automation Platform*: Red Hat Ansible Automation Platform is an end-to-end automation platform to configure systems, deploy software, and orchestrate advanced workflows. It includes resources to create, manage, and scale across the entire enterprise. It helps to manage multiple machines using instructions stored in “playbooks”, and when done well, playbooks are idempotent – negating the risks of unwanted side effects.
- *Unified Endpoint management with ManageEngine Endpoint Central*: Endpoint Central is a Unified Endpoint Management and security software that comprehensively addresses the requirements of IT administrators.

It helps IT administrators to perform patch management, software deployment, mobile device management, OS deployment and take remote control to troubleshoot devices. And with the help of endpoint security features, which includes vulnerability assessment, application control, device control, BitLocker management and browser security, IT administrators can safeguard their network endpoints effectively.

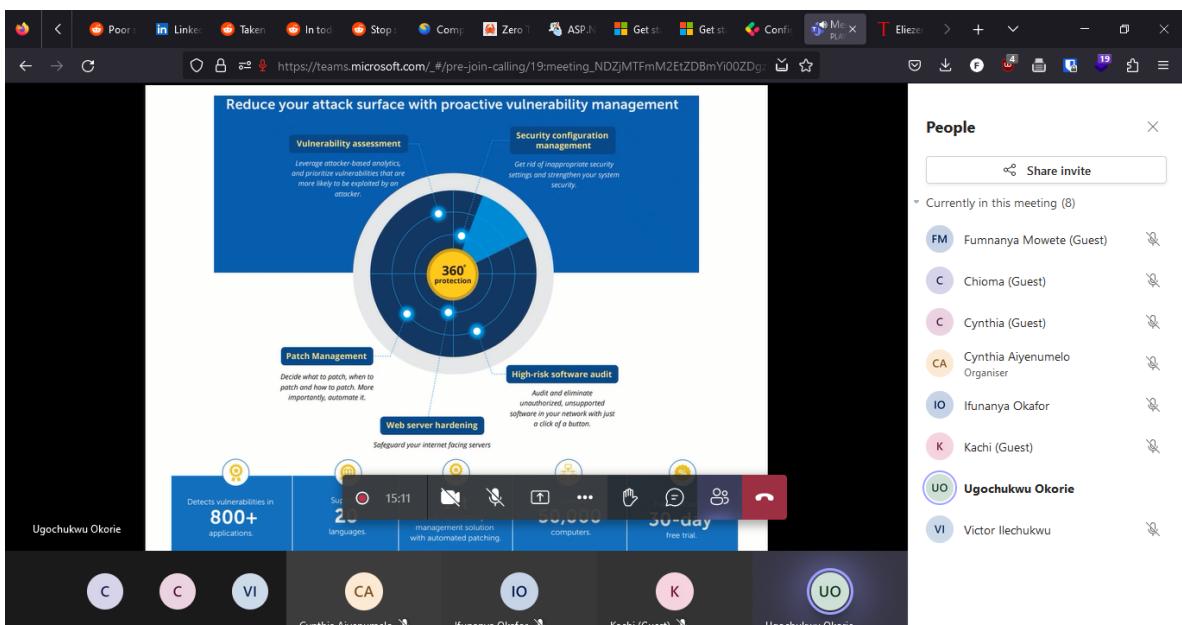


Figure 24: My supervisor demonstrating the capabilities of Endpoint Central

### 2.3.2. Soft skills

- *Teamwork:* As a member of an organisation, I was required to work with other employees on projects bigger than any individual would have been able to accomplish. I had to learn how to be a good team member in order to pursue the shared agenda.

<sup>8</sup>Portable Operating System Interface

<sup>9</sup>Open Containers Initiative

<sup>10</sup>Red Hat Enterprise Linux

- *Communication:* Good communication is necessary in an organisation – without it, structure would break down. I learnt how to use the appropriate channels for various communication (email, notes, etc.) depending on the severity of the message.
- *Networking:* Networking is essential in the real world of business and through my time at Converge, I was able to meet several people of benefit to my career, as well as learnt skills that would enable me to find more. These skills will boost my chances of succeeding in the industry.
- *Effective Research:* A lot of information on the Internet is stored away in obscure posts, blogs and documentation, and sifting through all that to get the parts that you need is an invaluable tool in the field. I learnt about various ways of utilising resources like search engines to acquire hard-to-find information, as well as tools to catalogue and store it.

### **3. Contributions of Knowledge Gained**

The knowledge gained during the course of the internship was highly influential on me – both at my time in the company, and for the future.

#### **3.1. Applicability of Knowledge**

##### **3.1.1. In the Field of Study and Educational Career**

Typically, Computer Science focuses on the theoretical foundations of modern computing, with a little detour into popular applications like Web Development.

But as a result of this internship, I've been exposed to lesser-known areas of Information Technology that are very crucial to modern business infrastructure – system administration, application containerisation, and cloud deployments – and as a result, have more career prospects available to me.

##### **3.1.2. In Converge**

I was able to work effectively and efficiently in the company. I collaborated with other employees in order to hit deadlines and achieve goals – thereby contributing to the success of the company.

##### **3.1.3. In the Larger Society**

The company created infrastructure for multi-national entities like financial institutions and manufacturing plants. Working effectively in Converge, trying to find the best solution to clients' problems contributed to their societal influence, as a catastrophe would be swiftly averted before it inconvenienced millions of people.

##### **3.1.4. In Relation with Curriculum**

The knowledge gained in the internship builds upon some of the earlier concepts introduced in courses like:

- CSC125 *Operating Systems I*
- CSC214 *High Performance Computing & Database Management I*
- CSC223 *Computer Hardware*
- CSC317 *Systems Analysis & Design*

Without this practical experience, realising the true value of the aforementioned courses would have been difficult, if not impossible.

### **3.2. Work Culture**

The core values shared by Converge are Service, Teamwork, Achievement, Respect, and Spirituality. We were all encouraged to uphold these values in our work and business dealings.

Spirituality was interesting for me – I was initially shocked at the fact that a devotion session was held every morning from 8:15am to 9am, but over time I came to appreciate it.

### **3.3. Challenges Faced**

As with any experience in life, there were challenges faced – both by me as an individual struggling to get used to a new working environment, and the company as a whole during the economic downturn.

#### **3.3.1. By Me**

- *Time Management Issues:* Coming into a new environment was jarring for me, as I suddenly found myself with a less regimented schedule and some free time on my hands. This led to me underestimating the amount of time some projects would take to complete and missing the deadlines as a result.

- *Communication Issues:* I was not used to the idea of just getting up and talking to one's colleagues, and as a result, missed out on some opportunities and created disorder in the organisation.

### 3.3.2. By Converge

- *Deadline Issues:* The Data Centre team was unable to meet some of their deadlines for a Dangote project – partly due to some shortcomings with contractors, along with problems with Red Hat Satellite. We had some calls with Red Hat support representatives to fix the latter issue.

The screenshot shows a Microsoft Teams message window with a table of project implementation progress. The table has columns for Task, Deadline, Progress, Status, and Description. Many tasks are marked as delayed or awaiting further action.

	Task	Deadline	Progress	Status	Description	
18	3. Windows Servers	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 70% Delayed The inventory creation, configuration and connection to the windows servers is still ongoing.	
19	4. Network Patch	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 0% Delayed Awaiting Dangote team to provide the patch file.	
20	5. Fortinet Security Device (FortiManager)	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 0% Delayed Awaiting Dangote team to provide the device.	
20	6. Azure	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 0% Delayed Awaiting Dangote team to provide the details.	
21	7. Gillab	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 100% Completed Awaiting Dangote team to provide the details.	
22	8. Automation Hub	30/11/2022	13/12/2022	Converge Team & Dangote Team	100% 100% Completed	
23	9. Ansible Playbooks for RHEL and Satellite Automation	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
24	1. Playbooks for OS Patches, Fixes and Security Update Installation	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
25	2. Playbooks for MOAT Installation and Onboarding to the Satellite Server	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
26	3. Playbooks for RHEL System Configuration	50 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
27	4. Playbooks for Registration of Client Systems to the Satellite Server	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
28	5. Playbooks for Onboarding the Client Systems to Red Hat Satellite	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 0% Delayed
29	Build and Test Ansible Playbooks for the following SAP workloads:	10 days	14/12/2022	27/12/2022	Converge Team & Dangote Team	100% 74% Delayed
30	1. Playbooks for Backup Hana Data	48:54				

Figure 25: A table of missed deadlines for a client Satellite implementation

- *Economic Issues:* The Nigerian economy had been on a decline and, as a result, certain economic problems arose. The USD<sup>11</sup>-NGN<sup>12</sup> exchange rate fluctuating daily was one such problem, as Converge regularly liaised with international companies which quoted prices in USD.

<sup>11</sup>United States Dollar

<sup>12</sup>Nigerian Naira

### **3.4. Projects**

During the course of my internship, I was able to take on several projects and trainings. Some of these are:

#### **3.4.1. Virtual Machines**

I was tasked with the creation of several virtual machines which ran:

- **Windows Server 2019:** I was able to set up several Windows Server VMs for the purpose of testing out client software and making a proof of concept for endpoint management. I set them up on the main data centre ESXi host and networked them using industry-standard practices. I opened ports in the firewall to isolate them and only allow trusted applications to go through, such as Endpoint Central.

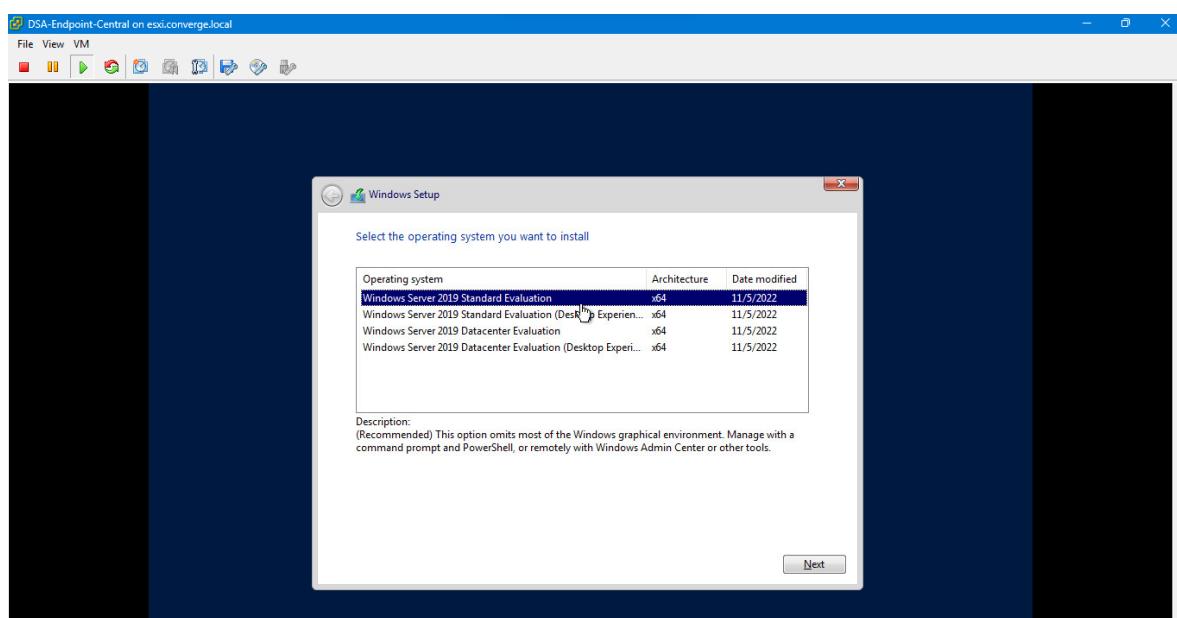


Figure 26: The Windows Server 2019 installer 'Select edition' section

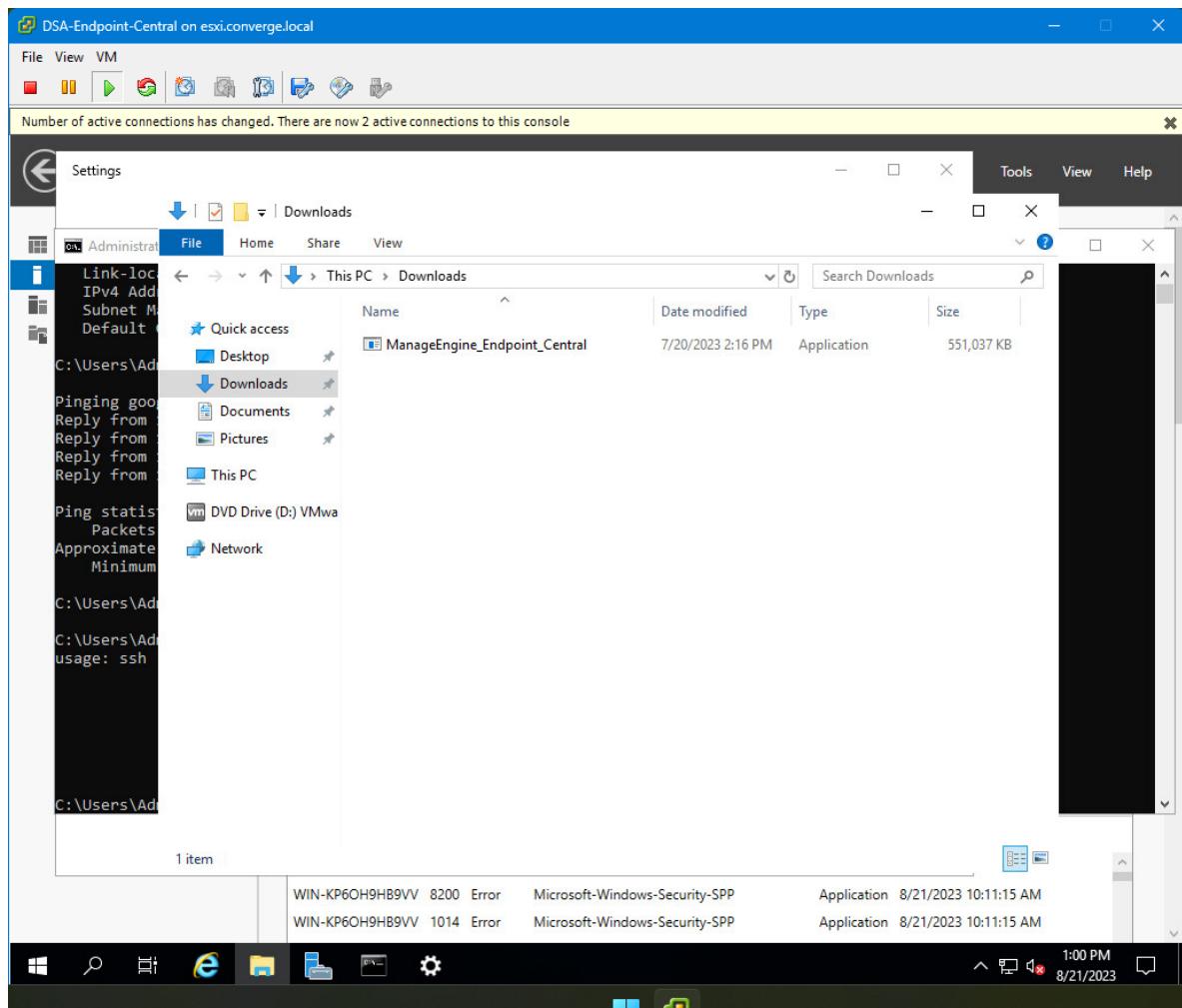


Figure 27: The Windows GUI showing a File Explorer window

- **Red Hat Enterprise Linux 8:** For the purpose of going further in the trainings I completed I was encouraged to make RHEL virtual machines and tinker with them. I used tools like Subscription Manager to add external repositories to the virtual machines, allowing third-party software to be installed through the `dnf` package manager.

 [victor.ilechukwu@convergroup.com](mailto:victor.ilechukwu@convergroup.com) Inbox  
Assignment  
To: kavan.mowete@convergroup.com, Cc: Ugochukwu Okorie

---

Dear Fumnanya,

Find the questions for your assignment below.

1. Spin up a rhel 7 server on vsphere with the following specs  
Ram = 4G  
Storage = 60  
Hostname = fumnanya.converge.local
2. Create a /ugo xfs filesystem and assign 5G to it

Perform the tasks on the office vmware platform. Find the credential below

IP address: 172.18.20.241  
Username: root  
Password: [REDACTED]

Thank you,  
Victor Ilechukwu  
Converge I G. C. T.  
The Quad Building, No. 20 Layi Yusuf Crescent,  
Lekki Phase 1, Lagos State.  
Tel.: +234 1 3425910  
Mobile: +234 7035075735  
Email: [victor.ilechukwu@convergroup.com](mailto:victor.ilechukwu@convergroup.com)  
Website: [www.convergroup.com](http://www.convergroup.com)  
Support: [support@convergroup.com](mailto:support@convergroup.com)

Figure 28: An email with instructions to create a RHEL VM

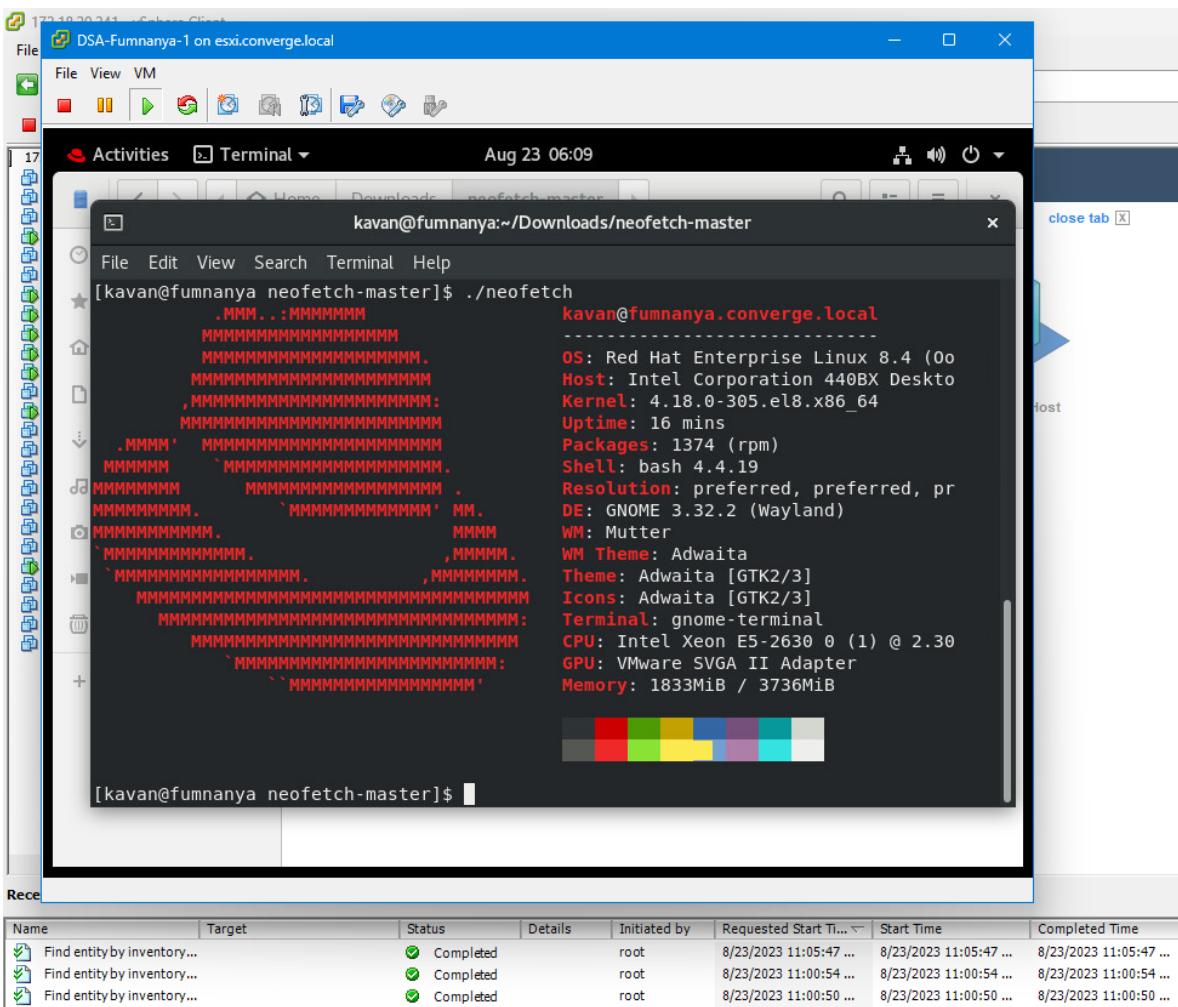


Figure 29: A RHEL virtual machine running the neofetch CLI tool

### 3.4.2. ManageEngine Endpoint Central

I was tasked with making a proof of concept deployment of Endpoint Central using the available virtual machines. This was done to determine whether it would be a viable offering for our clients. I also gave a presentation to the DSA team showing my finished work, findings, and recommendations.

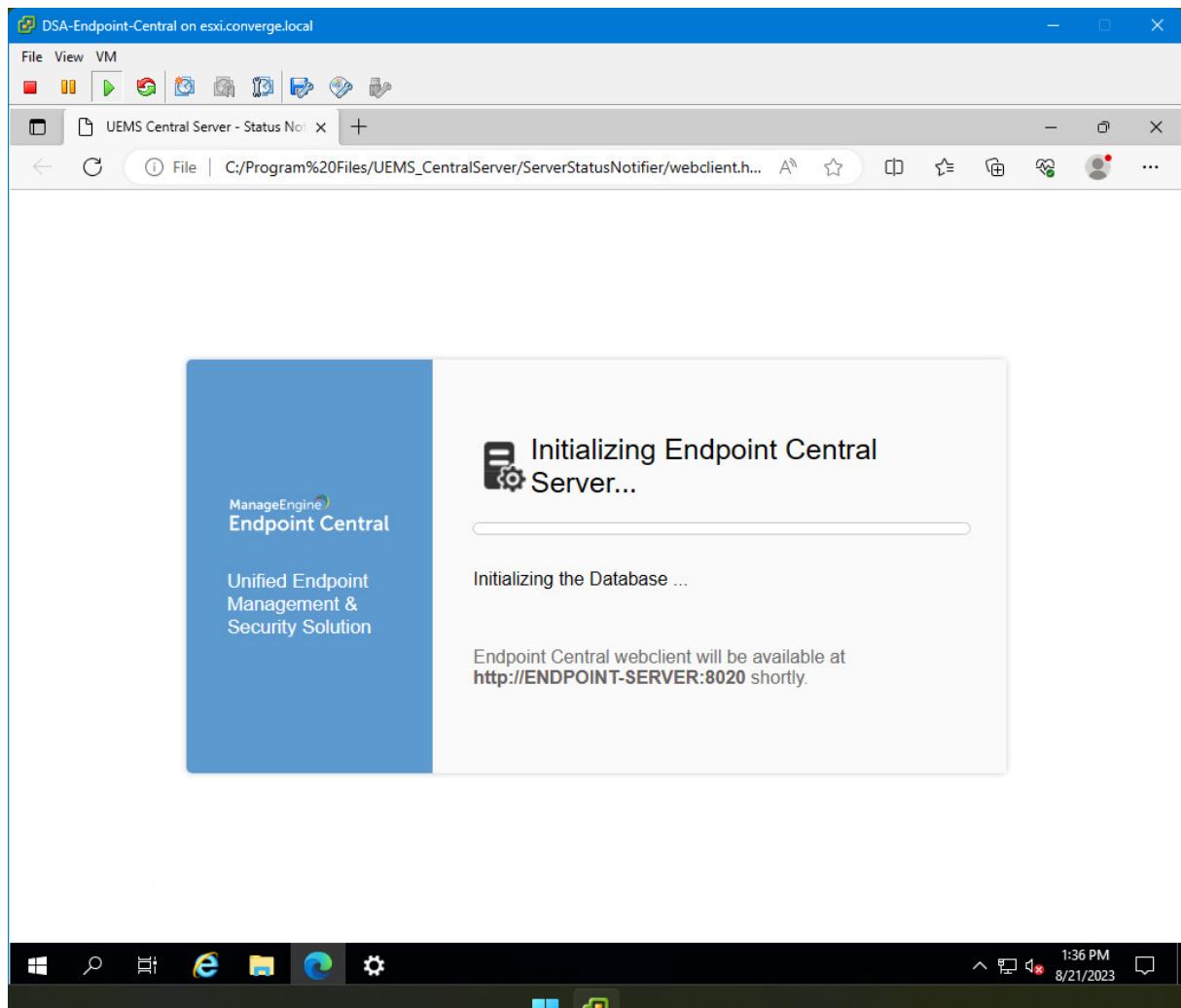


Figure 30: Endpoint Central dashboard initialisation

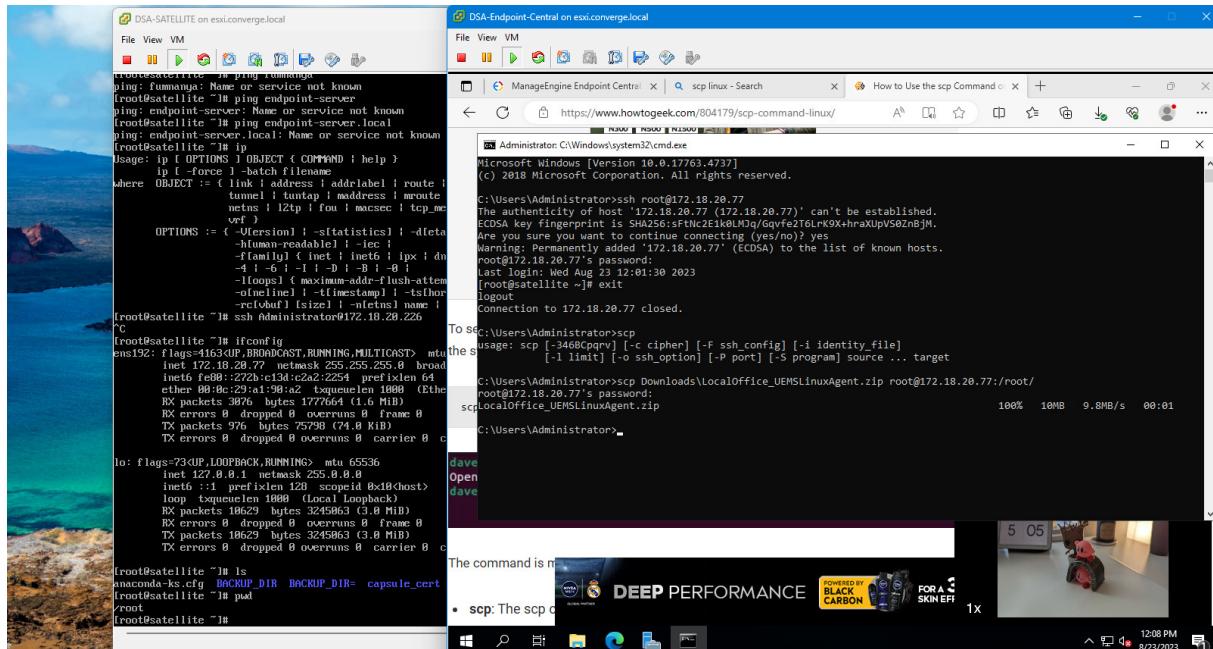


Figure 31: Installation of the Endpoint Central Server agent on a remote Red Hat Satellite machine

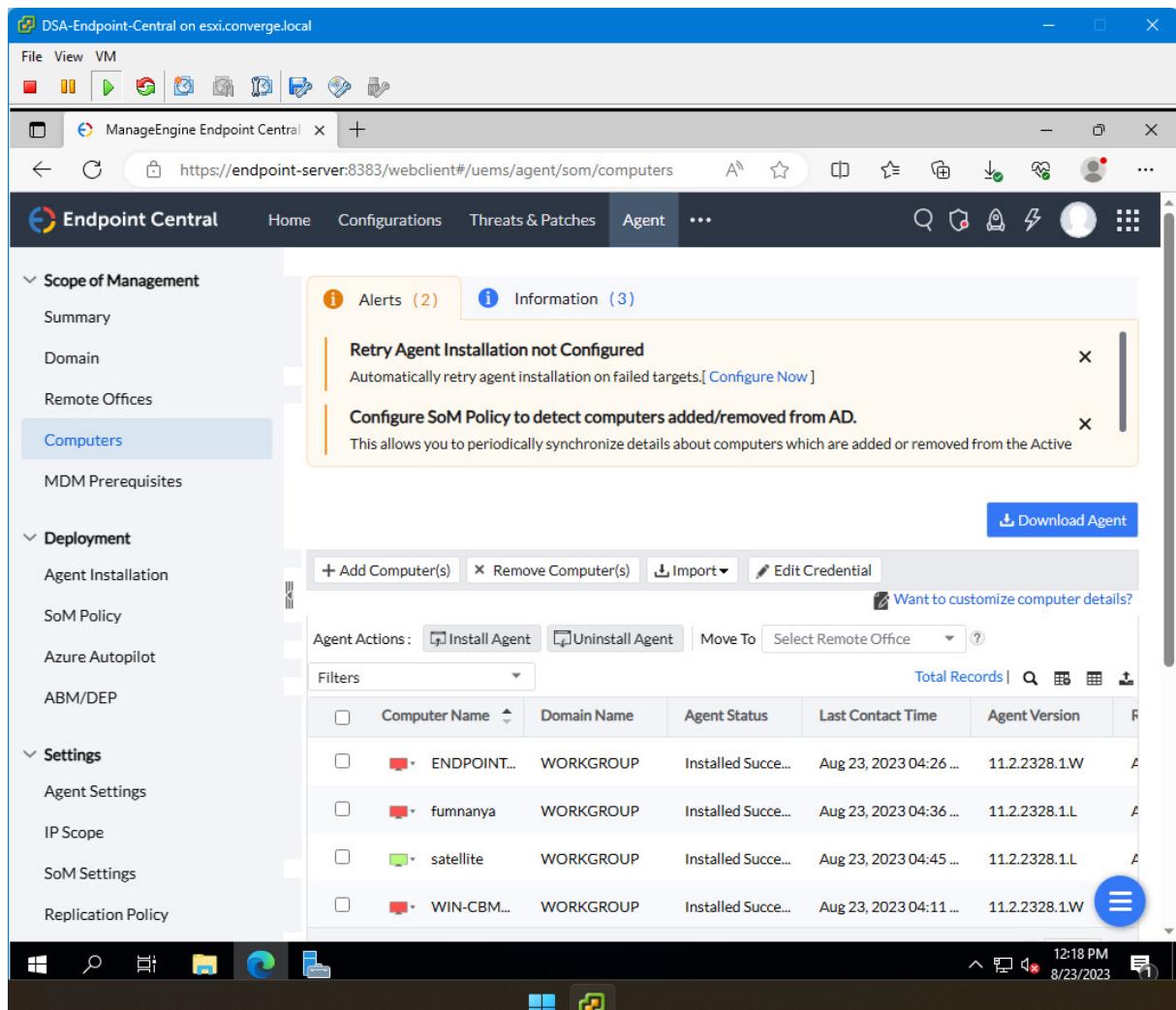


Figure 32: Endpoint Central dashboard showing discovered computers

### 3.4.3. Trainings completed

In order to enhance my knowledge of various Red Hat products and solutions, I completed several accreditations and got on the way to becoming a RHCSA<sup>13</sup> and RHCE<sup>14</sup>. Some courses I completed are:

- RH124 *Red Hat System Administration I*: The course provides students with Linux administration competence by focusing on core administration tasks.

<sup>13</sup>Red Hat Certified System Administrator

<sup>14</sup>Red Hat Certified Engineer

This course also provides a foundation for students who plan to become full-time Linux system administrators by introducing key command-line concepts and enterprise-level tools.

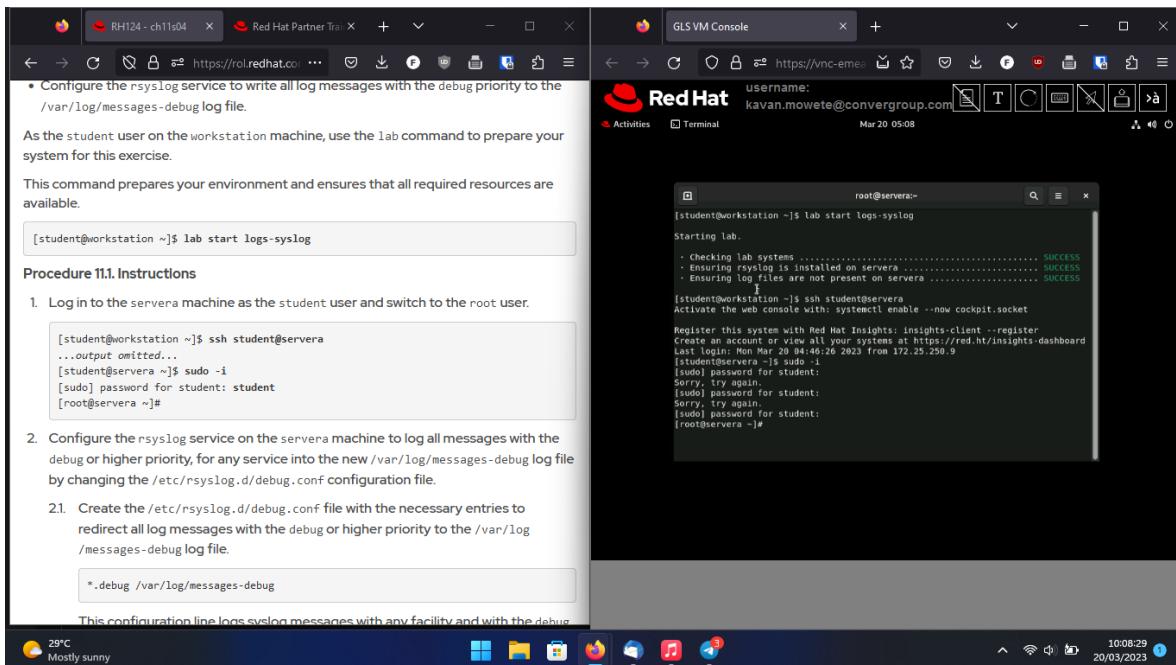


Figure 33: RH124 course content and interactive lab

- *RH134 Red Hat System Administration 2:* The course goes deeper into core Linux system administration skills in storage configuration and management, installation and deployment of Red Hat Enterprise Linux, management of security features such as SELinux, control of recurring system tasks, management of the boot process and troubleshooting, basic system tuning, and command-line automation and productivity.
- *RH403 Red Hat Satellite 6 Administration:* This lab-based course demonstrates how to configure Red Hat Satellite 6 to deploy and manage Red Hat Enterprise Linux systems and software at any scale, going into how to manage the software development life cycle of a subscribed host and its

configuration, and to provision hosts integrated with software and Ansible configuration management upon deployment.

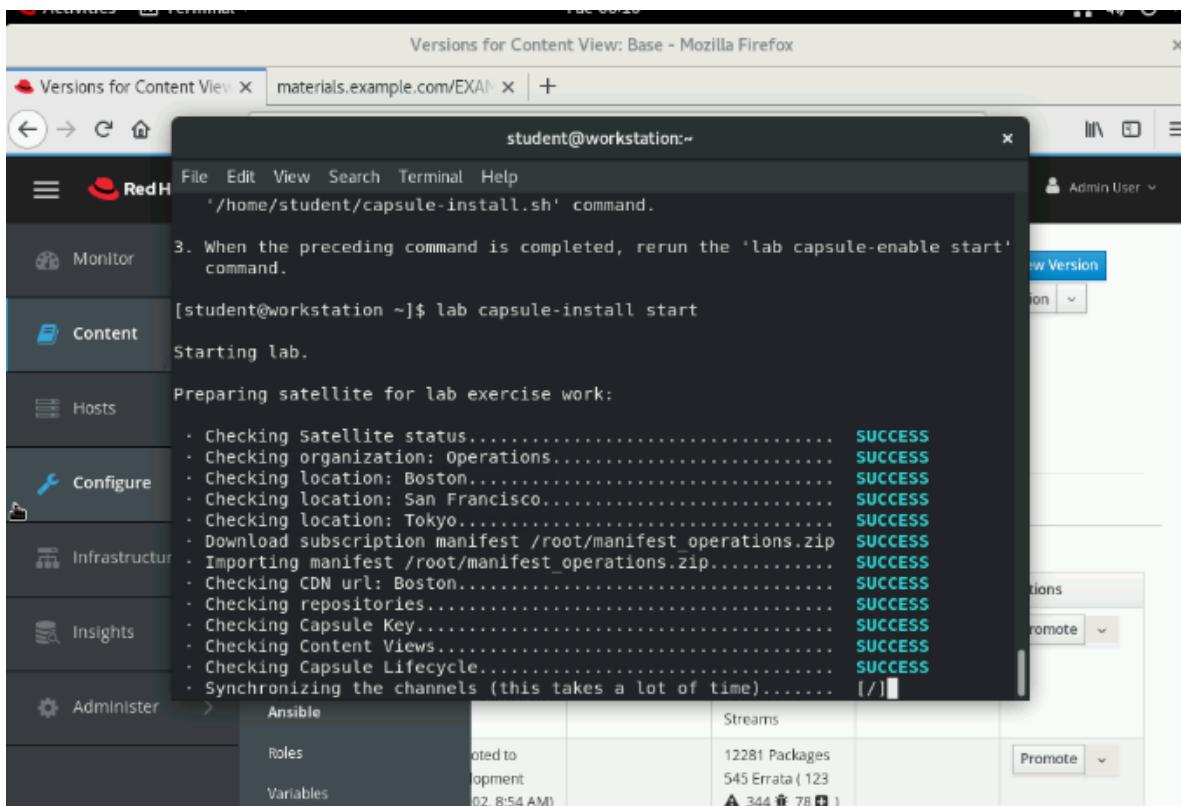


Figure 34: The RH403 interactive lab being initialised

- *RH294 Red Hat Enterprise Linux Automation with Ansible*: The course is designed for Linux system administrators and developers who need to automate provisioning, configuration, application deployment, and orchestration.
- *DO180 Red Hat OpenShift Administration I: Managing Containers and Kubernetes*: This course prepares OpenShift Cluster Administrators to perform day-to-day management of Kubernetes workloads and collaborate with Developers, DevOps Engineers, System Administrators, and SREs to ensure the availability of application workloads.

This course focuses on managing typical end-user applications that are often accessible from a web or mobile UI and represent the majority of cloud native and containerised workloads.

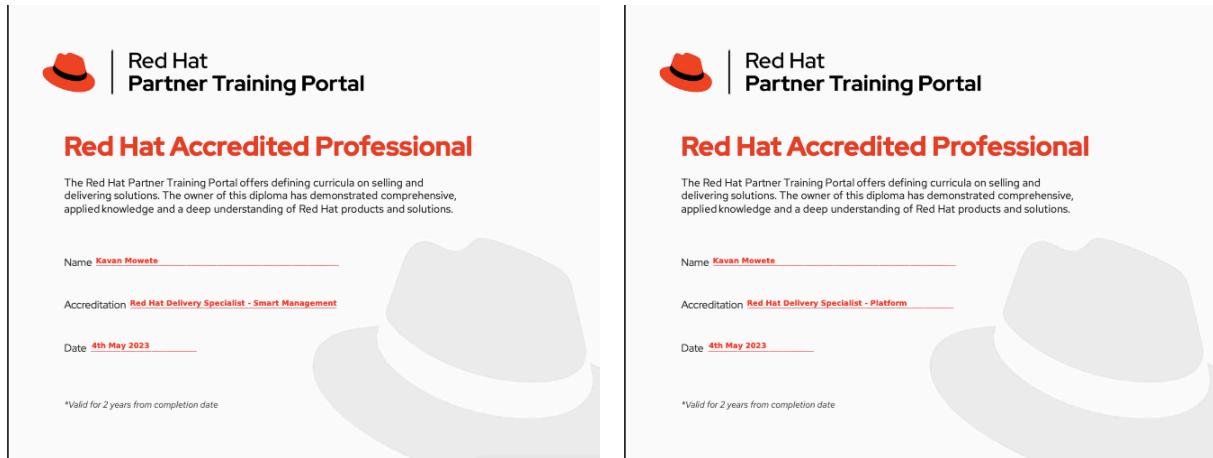


Figure 35: Red Hat Delivery Specialist Accreditation certificates

## **4. Conclusion & Recommendations**

### **4.1. Conclusion**

My internship experience has been nothing short of transformative and immensely beneficial to both my education and personal growth. Throughout this journey, I have had the privilege of gaining hands-on experience and insights that have truly opened my eyes to the complexities and intricacies of the industry. This internship has not only expanded my technical knowledge but has also enriched my understanding of the real-world applications of the concepts I've learned in the classroom.

One of the most significant takeaways from this experience has been the opportunity to work alongside seasoned professionals and experts in the industry. Their mentorship and guidance have been invaluable in shaping my understanding of best practices, problem-solving approaches, and effective communication within a professional setting. Learning from their experiences and absorbing their wisdom has not only improved my technical skills but has also fostered a sense of maturity and professionalism that will undoubtedly serve me well in my future career.

In conclusion, my internship has been a remarkable chapter in my education, one that has not only expanded my knowledge but has also instilled in me a sense of purpose and direction. I am now better equipped, not just academically, but as a more well-rounded individual, ready to face the challenges and opportunities that lie ahead. I am deeply grateful for this eye-opening experience

and look forward to applying the valuable lessons learned here in my future endeavors.

#### **4.2. Recomendations**

While the work experience program has undeniably proven to be an invaluable component of our education, it is imperative that we address the need for a more practical classroom experience to prevent students from experiencing culture shock when they enter the business world.

First and foremost, there should be a deliberate effort to enhance the practicality of classroom education. As we saw in Chapter 3.1.4, incorporating more hands-on projects, case studies, and real-world simulations into the curriculum is crucial to better prepare students for the challenges and dynamics of a professional environment. By doing so, we can help students develop essential skills such as critical thinking, problem-solving, and effective communication, all of which are indispensable in the workplace.

Moreover, we should explore opportunities for collaboration with industry partners. Encouraging closer ties between educational institutions and businesses can provide students with a more accurate understanding of what to expect in a professional setting. This could involve inviting guest lecturers, organizing industry visits, or establishing coursework that integrates classroom learning with practical experience. Such initiatives can demystify the corporate world and make students more confident as they enter the workforce.

Mentorship programs within our educational system would also be highly beneficial. These programs can offer students valuable guidance and insights

from professionals in their chosen fields, further bridging the gap between theory and practice.

In addition to technical skills, there should be a stronger emphasis on soft skills development within our curriculum. This includes training in areas like communication, teamwork, time management, and problem-solving. These skills are vital for navigating the challenges students may encounter in a business setting and will contribute to a more well-rounded skill set.

Furthermore, we should consider revising our assessment methods to incorporate more practical, real-world tasks. This would enable students to demonstrate their ability to apply their knowledge and skills in practical scenarios, providing a more accurate representation of their readiness for the professional world.

In conclusion, while our work experience program has been an excellent preparatory element, we must not neglect the need to improve the classroom environment. By implementing these recommendations, we can better equip our students with the skills and knowledge they need to excel in their future careers, fostering a smoother and more confident transition into the business world.

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